

Trig Equations

Solve each of the following.

1. $5 \sin(4t) - 3 = 0$ on the interval $[-1, 2]$
2. $3 \cos\left(\frac{z}{4}\right) + 2 = 0$ on the interval $[0, 40]$
3. $3 \cos(8x) - 12 = 0$ on the interval $[-8, 14]$
4. $10 \sin\left(\frac{y}{2}\right) + 7 = 1$ on the interval $[20, 35]$

Exponential and Logarithm Equations

Solve each of the following.

5. $3e^{2x^2-7} + 2 = 90$
6. $2x - 3 = (4x - 6)e^{5x-12}$
7. $\ln(x-5) + \ln(x+6) = -2$ Note that you'll need the quadratic formula on this one and don't get too excited about the "messy" numbers here.

Rates of Change and Tangent Lines

8. An object is moving and we want to determine if it's moving to the right (positive velocity), left (negative velocity), or not moving (zero velocity) at $t = 0$. The position of the object is given by

$$s(t) = \ln(8t + 4) - t^2 + 6t$$

To answer this problem you'll need to estimate the instantaneous velocity at $t = 0$. Do this by computing the average velocity (*i.e.* the average rate of change of the position function) between $t = 0$ and the following values of t . Use at least 7 decimal places for all computations.

(a) -0.1 (b) -0.01 (c) -0.001 (d) -0.0001 (e) 0.1 (f) 0.01 (g) 0.001 (h) 0.0001

9. Find the tangent line to $f(x) = \sin(x^2 - 9)$ at $x = 3$. To estimate the slope of the tangent line compute the slopes of the secant lines, m_{PQ} , at the following points and use the results to estimate the slope. Use at least 7 decimal places for all computations.

(a) 2.9 (b) 2.99 (c) 2.999 (d) 2.9999 (e) 3.1 (f) 3.01 (g) 3.001 (h) 3.0001

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The Limit

10. Explain in your own words what is meant by

$$\lim_{x \rightarrow 7} f(x) = -25$$

Is it possible to also have $f(7) = 100$? Why or why not?

For problems 11 & 12 use at least 7 decimal places in the function evaluations.

11. Evaluate $f(x) = \frac{x^2 - 3x - 4}{4x - x^2}$ at the given points and estimate the value of $\lim_{x \rightarrow 4} \frac{x^2 - 3x - 4}{4x - x^2}$.

(a) 3.9 (b) 3.99 (c) 3.999 (d) 3.9999 (e) 4.1 (f) 4.01 (g) 4.001 (h) 4.0001

12. Evaluate $g(t) = \frac{1 - e^{4t+8}}{t^2 - 4}$ at the given points and estimate the value of $\lim_{t \rightarrow -2} \frac{1 - e^{4t+8}}{t^2 - 4}$.

(a) -1.9 (b) -1.99 (c) -1.999 (d) -1.9999 (e) -2.1 (f) -2.01 (g) -2.001 (h) -2.0001